IFW AF

PATENT
Customer No. 22,852
Attorney Docket No. 04329.2308

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
	)	
Atsushi MURAKOSHI et al.	)	Group Art Unit: Group Art Unit: 2881
	)	
Application No.: 09/559,345	)	Examiner: Nguyen, Kiet Tuan
	)	
Filed: April 27, 2000	)	Confirmation No.: 2899
	)	
For: ION GENERATION METHOD AND FILAMENT FOR ION GENERATION APPARATUS	)	

Mail Stop Appeal Brief--Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

TRANSMITTAL OF APPEAL BRIEF (37 C.F.R. 41.37)

Transmitted herewith is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed on August 20, 2004.

This application is on behalf of

☐ Small Entity ☒ Large Entity

Pursuant to 37 C.F.R. 41.20(b)(2), the fee for filing the Appeal Brief is:

☐ $170.00 (Small Entity)

☒ $340.00 (Large Entity)

TOTAL FEE DUE:

Notice of Appeal Fee	$0 (submitted August 20, 2004)
Extension Fee (if any)	$0
Total Fee Due	$0

☒ Enclosed is a check for $340 to cover the above fees.

PETITION FOR EXTENSION. If any extension of time is necessary for the filing of this Appeal Brief, and such extension has not otherwise been requested, such an extension is hereby requested, and the Commissioner is authorized to charge necessary fees for such an extension to our Deposit Account No. 06-0916. A duplicate copy of this paper is enclosed for use in charging the deposit account.

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: October 20, 2004

By: E. Niemeyer
Elizabeth A. Niemeyer
Reg. No. 52,070

PATENT
Customer No. 22,852
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Sir:

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

In support of the Notice of Appeal filed August 20, 2004, and further to Board Rule 37, Appellants present this brief and enclose herewith a check for the fee of $340.00 required under 37 C.F.R. § 1.17(c).

This Appeal responds to the April 21, 2004 final rejection of claims 1, 5, 21, and 29–37 and the August 9, 2004 Advisory Action identifying claims 1, 5, 21, 29–34, and 38–39 as pending for purposes of Appeal.

If any additional fees are required or if the enclosed payment is insufficient, Appellants request that the required fees be charged to Deposit Account No. 06-0916.

I. Real Party In Interest

Kabushiki Kaisha Toshiba is the real party in interest.

II. Related Appeals and Interferences

There are currently no other appeals or interferences, of which Appellants, Appellants' legal representatives, and Assignee are aware, that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. Status Of Claims

Claims 1, 5, 21, 29–34, and 38–39 are pending in this application.

Claims 1, 5, 21, and 29–34 have been finally rejected by the Examiner and Appellants appeal the rejection of those claims. Claims 38 and 39 were entered in an August 9, 2004 Advisory Action for purpose of this Appeal. Claims 2–4, 6–20, 22–28, and 35–37 have been previously canceled. The attached Appendix includes a listing of the claims. There are no un-entered amendments after final.

IV. Status Of Amendments

Appellants filed an Amendment After Final and Request for Withdrawal of Finality of Office Action on July 21, 2004, which proposed amending claim 34, canceling claims 35–37, and adding new claims 38–39. The July 21, 2004 Amendment was entered by the Examiner for purposes of this Appeal.

V. Summary of Claimed Subject Matter

Ion irradiation is widely employed for implanting impurities into a semiconductor substrate, thus forming pn junctions. (*See* Specification at p. 1, ll. 18–22; Figure 1.) Ion irradiation apparatus generates ions, extracted to form an ion beam, which eventually irradiates the surface of a substrate through a mask. (*See id.* at p. 13, l. 15–p. 14, l. 17; Figure 1.)

An exemplary ion source chamber is a Bernas-type ion source chamber. (*See id.*, p. 14, ll. 7–11; Figures 2A and 2B.) To generate ions, gas, such as argon, may be supplied to an arc chamber through one inlet and vapor discharged from an oven by heating a source material may be introduced through another inlet. (*See id.*, p. 14, l. 23–p. 15, l. 2; Figures 2A and 2B.) The vapor supplied into the arc chamber is then ionized and the ions are extracted through an ion extraction opening. (*See id.*, p. 15, ll. 2–5; Figure 2B.) A problem, however, can be generating a stable ion beam. (*See id.* at p. 3, ll. 10–17.)

A. The Independent Claims

One implementation of this invention is recited in claim 1, which recites a method of generating ions (*see id.*, p. 6, ll. 23–26), comprising heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm to generate a vapor of said indium iodide (InI) (*see id.*, p. 14, ll. 24–26; p. 15, ll. 6–10; p. 17, ll. 8–13; Figure 2B), and generating indium (In) ions by discharging said vapor (*see id.*, p. 14, l. 27–p. 16, l. 5).

Claim 5 recites another implementation of the invention as a method of irradiating ions (*see id.*, p. 6, ll. 23–26), comprising heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm to generate a vapor of said indium iodide (InI) (*see id.*, p. 14, ll. 24–26; p. 15, ll. 6–10; p. 17, ll. 8–13; Figure 2B), generating indium (In) ions by discharging said vapor (*see id.*, p. 14, l. 27–p. 16, l. 5), and selectively irradiating said indium (In) ions onto a substrate to be processed (*see id.*, p. 13, l. 15–p. 14, l. 6; Figure 1).

In another implementation of the invention, claim 31 recites a method of generating ions (*see id.*, p. 6, ll. 23–26), comprising heating an ion source material composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle and whose particle size is larger than a diameter of said outlet nozzle (*see id.* p. 15, ll. 6–16; Figure 2B); and generating indium (In) ions by discharging said vapor (*see id.*, p. 14, l. 27–p. 16, l. 5).

Additionally, claim 34 recites an implementation of the invention of a method of irradiating ions (*see id.*, p. 6, ll. 23–26), comprising heating an ion source material to generate vapor thereof, the ion source material being composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle and whose particle size is larger than a diameter of said outlet nozzle (*see id.* p. 15, ll. 6–16; Figure 2B); generating indium (In) ions by discharging said vapor (*see id.*, p. 14, l. 27–p. 16, l. 5); and selectively irradiating said indium (In) ions onto a substrate to be processed (*see id.*, p. 13, l. 15–p. 14, l. 6; Figure 1).

VI. Grounds of Rejection

A. Claims 1, 5, 21, and 29–34 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Japanese KOKAI publication number 3-13576 ("*Isaka*").

B. Claims 38 and 39 were newly added by amendment on July 21, 2004, and have not been rejected by the Examiner. Claims 38 and 39, however, depend from claims 5 and 34 and incorporate subject matter recited in claims 19 and 1, respectively. Claims 5, 34, 19, and 1 were each rejected under 35 U.S.C. § 103(a) as unpatentable over *Isaka*. The Examiner indicated in the August 9, 2004 Advisory Action that claims 38 and 39 were rejected but did not describe the groups of rejection.

VII. Argument

Claim 1 recites a method of generating ions, comprising heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm to generate a vapor of the indium iodide (InI) and generating indium (In) ions by discharging the vapor. Claims 21, 29, and 30 each depend from claim 1 and recite, respectively, heating the indium iodide (InI) at a temperature of not lower than 275 °C and not higher than 380°C to generate the vapor of the indium iodide (InI); supplying the indium iodide into an oven which has an outlet nozzle for the vapor, followed by heating the indium iodide whose particle size is larger than a diameter of the outlet nozzle; and a support gas inlet to an arc chamber and a vapor inlet to the arc chamber are provided on one face of the arc chamber, and are configured to introduce support gas and the vapor into the arc chamber.

Claim 5, although of different scope, contains recitations similar to those of claim 1, and recites a method of irradiating ions, comprising heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm to generate a vapor of the indium iodide (InI), generating indium (In) ions by discharging the vapor, and selectively irradiating the indium (In) ions onto a substrate to be processed. Claim 38 depends from claim 5 and recites supplying the indium iodide into an oven which has an outlet nozzle for the vapor, followed by heating the indium iodide whose particle size is larger than a diameter of the outlet nozzle.

Claim 31 recites a method of generating ions, comprising heating an ion source material composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle and whose particle size is larger than a diameter of the outlet nozzle, and generating indium (In) ions by discharging the vapor. Claims 32 and 33 depend from claim 31 and recite, respectively, heating the indium iodide at a temperature of not lower than 275°C and not higher than 380°C; and a support gas inlet to an arc chamber and a vapor inlet to the arc chamber are provided on one face of the arc chamber, and are configured to introduce support gas and the vapor generated into the arc chamber.

Claim 34 although of different scope, contains recitations similar to those of claim 31, and recites a method of irradiating ions, comprising heating an ion source material to generate vapor thereof, the ion source material being composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle and whose particle size is larger than a diameter of the outlet nozzle, generating indium (In) ions by discharging the vapor, and selectively irradiating the indium (In) ions onto a substrate to be

processed. Claim 39 depends from claim 34 and recites a particle size larger than 1 mm and not larger than 5 mm.

A. The Rejection of Claims 1, 5, 21, 29, and 30

Appellants appeal the rejection of claims 1, 5, 21, 29, and 30 under 35 U.S.C. § 103(a) as unpatentable over *Isaka* because a *prima facie* case for obviousness has not been made by the Examiner. (4/21/04 Final Office Action at 2; and 12/23/03 Office Action at 2–3.) To establish a *prima facie* case of obviousness under §103(a), each of three requirements must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine references or modify a reference. (MPEP § 2143 (8th ed. Rev. Feb. 2003).) Second, there must be a reasonable expectation of success. (*Id.*) Moreover, both of these requirements must "be found in the prior art, and not based on applicant's disclosure." (*Id.*) Third, the reference or references, taken alone or in combination, must disclose or suggest every element recited in the claims. (MPEP §2143.03.)

In the April 21, 2004 Final Office Action, the Examiner rejected the pending claims by referring the applicants to the reasons indicated in the December 23, 2003 Office Action without repeating those reasons. (4/21/04 Final Office Action at 2.) Since substantive reasons are set forth in the December 23, 2003 Office Action, Appellants provide citation to that Office Action, in order to specify reasons set forth by the

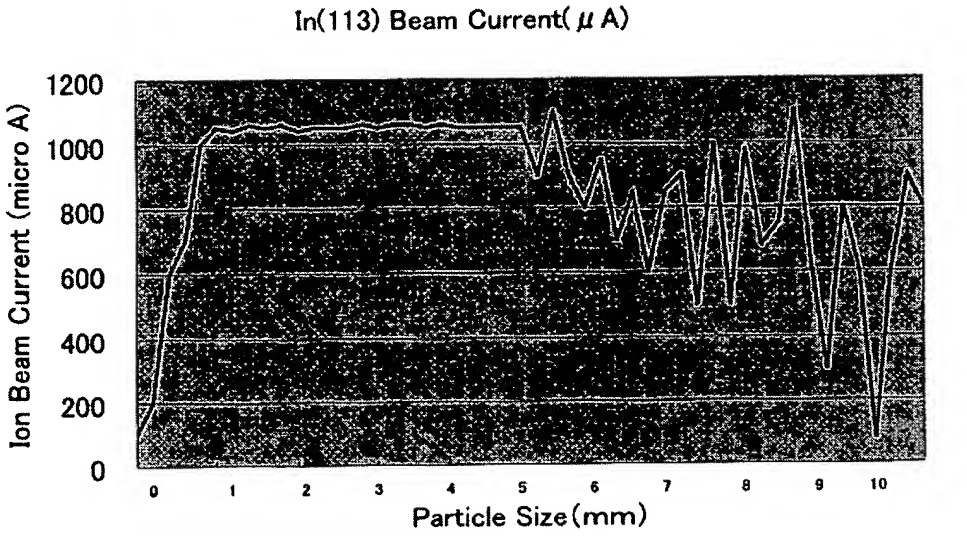
Examiner for rejecting the pending claims. Appellants provide citation to the April 21, 2004 Final Office Action where appropriate.

Although the Examiner rejected claim 1 under 35 U.S.C. § 103(a) over *Isaka*, the Examiner acknowledges that *Isaka* fails to disclose each element of claim 1 and fails to identify any other reference to compensate for *Isaka's* deficiencies. (12/23/03 Office Action at 2–3.) For example, *Isaka* fails to teach, at least, "heating an ion source material composed of indium iodide (InI) and *having a particle size larger than 1 mm and not larger than 5 mm*," (emphasis added) as recited in claim 1. (12/23/03 Office Action at 2–3.) Yet the Examiner alleged, without support, without identifying any motivation to modify *Isaka*, and without identifying any expectation of success, that these are "obvious variations in design." In other words, the Examiner has not provided any of the three requirements for a *prima facie* showing of obviousness.

Isaka at best discloses "granular indium iodide." (*Isaka*, abstract, translation at 4.) This would in no way motivate one to heat "an ion source material composed of indium iodide (InI) and *having a particle size larger than 1 mm and not larger than 5 mm*," (emphasis added) as recited in claim 1. The Examiner must provide a suggestion or motivation to modify *Isaka*, must identify a reasonable expectation of success, and must cite references that alone or in combination disclose or suggest every element recited in the claim. The rejection lacks each of these criteria.

The Examiner also alleges that the Appellants do not demonstrate "what and/or how the results that are difference [sic] between vaporizing different particle sizes." (4/21/04 Office Action at 3.) On the contrary, during interviews on May 21, 2004, and

July 21, 2004, with the Examiner, and in the July 21, 2004 Amendment After Final, Appellants' representative provided the following graphical information demonstrating the effect on the beam current of the varying particle size.



As is shown above, a particle size larger than 1 mm and not larger than 5 mm produces a more stable beam current than particle sizes generally beyond this range. During the May 21, 2004 interview, the Examiner expressed surprise at the results and requested additional information regarding testing conditions. During the July 21, 2004 interview and in the July 21, 2004 Amendment After Final, Appellants' representative presented the relevant testing conditions for the above data to the Examiner:

- Arc voltage 90V
- Arc current 2A
- Source magnet current 40A
- Oven temperature 340°C
- Extraction voltage 30keV

- Acceleration energy 30keV
- Data obtained three minutes after the start of arc discharge

Thus, although the Examiner has not made a *prima facie* showing of obviousness, the Appellants have provided clear evidence that the claimed invention produces a more stable beam current. This is nowhere taught or suggested in *Isaka* or elsewhere in the cited art.

Therefore *Isaka* does not render claim 1 obvious, and a finding of obviousness is contrary to the evidence. Appellants respectfully request that the Board reverse the rejection of claim 1 under 35 U.S.C. § 103(a).

Claims 21, 29, and 30 depend from claim 1. As explained, the rejection of claim 1 is unsupported by *Isaka*. Accordingly the rejection of claims 21, 29, and 30 are also unsupported by the reference for at least the same reasons set forth in connection with claim 1. Therefore, Appellants respectfully request that the Board reverse the rejection of these claims.

Claim 5, while of different scope, contains recitations similar to those of claim 1, and recites, *inter alia*, "heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm to generate a vapor of said indium iodide (InI)." Since *Isaka* fails to teach or suggest at least "heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm," as recited claim 1, it likewise fails to disclose or suggest that language with respect to claim 5.

Therefore *Isaka* does not render claim 5 obvious, and a finding of obviousness is contrary to the evidence. Appellants respectfully request that the Board reverse the rejection of claim 5 under 35 U.S.C. § 103(a).

Claim 38 depends from claim 5. As explained, the rejection of claim 5 is unsupported by *Isaka*. Although claim 38 has not been specifically rejected, Appellants respectfully argue that any rejection of claim 38 cannot be supported on the basis of the teachings in *Isaka*.

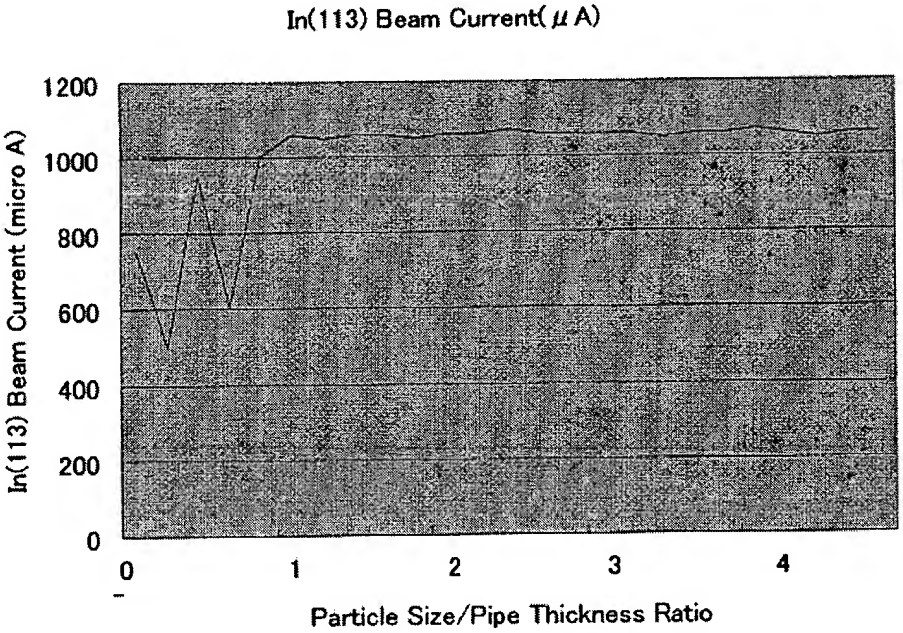
B. Rejection of Claims 31–34

Appellants appeal the rejection of claims 31–34 under 35 U.S.C. § 103(a) as unpatentable over *Isaka* because a prima facie case for obviousness has not been made by the Examiner. (12/23/03 Office Action at 2–3.)

Claim 31 recites, *inter alia*, "heating an ion source material composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle *and whose particle size is larger than a diameter of said outlet nozzle*" (emphasis added). *Isaka*, by contrast, appears to disclose a particle size of indium iodide 3 *smaller* than the diameter of the outlet of vessel 4. (*See Isaka*, Figure 1.) Consequently, not only does *Isaka* fail to disclose or suggest each claim element, but instead *Isaka* teaches away from a "*particle size [being] larger than a diameter of said outlet nozzle*," as recited in claim 31. That is, *Isaka* fails to teach or suggest each claim element recited in claim 31, fails to provide any expectation of success, and fails to provide any motivation to modify itself.

The Examiner further alleges that "Applicant does not prove what and/or how the results that are difference between vaporizing different particle sizes. Since vaporizing the particles having a size larger than 1 mm and not larger than 5 mm or larger than a diameter of the outlet nozzle to produce the molecule ions does not effect to the size and shape of that particles." (4/21/04 Office Action at 3.) Appellants disagree.

As shown in the following graph, which Appellants' representative presented to the Examiner during the May 21, 2004 Interview, a particle size greater than the pipe diameter produces a more stable beam current.



Moreover, during the May 21, 2004 interview, the Examiner expressed surprise at the above test results and requested additional information regarding the testing conditions. These data were obtained under the same testing conditions as the data

above at page 9, which were presented to the Examiner during the July 21, 2004 interview and in the July 21, 2004 Amendment After Final.

Therefore *Isaka* does not render claim 31 obvious, and a finding of obviousness is contrary to the evidence. Appellants respectfully request that the Board reverse the rejection of claim 31 under 35 U.S.C. § 103(a).

Claims 32 and 33 depend from claim 31. As explained, the rejection of claim 31 is unsupported by *Isaka*. Appellants, therefore, respectfully request that the Board reverse the rejection of these claims.

Claim 34, while of different scope, includes recitations similar to those of claim 31, and recites, *inter alia*, "heating an ion source material composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle and whose particle size is larger than a diameter of said outlet nozzle." For at least the reasons given with respect to claim 31, *Isaka* does not render claim 34 obvious, and a finding of obviousness is contrary to the evidence. Appellants respectfully requests that Board reverse the rejection of claim 34 under 35 U.S.C. § 103(a).

Claim 39 depends from claim 34. As explained, the rejection of claim 34 is unsupported by *Isaka*. Although claim 39 has not been specifically rejected, Appellants respectfully argue that any rejection of claim 39 cannot be supported on the basis of the teachings of *Isaka*.

VIII. Conclusion

For the reasons given above, pending claims 1, 5, 21, 29–34, and 38–39 are allowable and Appellants respectfully request that the Board reverse the Examiner's rejection of those claims.

To the extent any extension of time under 37 C.F.R. § 1.136 is required to obtain entry of this Appeal Brief, such extension is hereby respectfully requested. If there are any fees due under 37 C.F.R. § 1.16 or 1.17, which are not enclosed herewith, including any fees required for an extension of time under 37 C.F.R. § 1.136, please charge such fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: October 20, 2004

By: _____
Elizabeth A. Niemeyer
Reg. No. 52,070

Claims Appendix to Appeal Brief Filed October 20, 2004

Claim 1. A method of generating ions, comprising:

heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm to generate a vapor of said indium iodide (InI); and

generating indium (In) ions by discharging said vapor.

Claim 5. A method of irradiating ions, comprising:

heating an ion source material composed of indium iodide (InI) and having a particle size larger than 1 mm and not larger than 5 mm to generate a vapor of said indium iodide (InI);

generating indium (In) ions by discharging said vapor; and

selectively irradiating said indium (In) ions onto a substrate to be processed.

Claim 21. The method according to claim 1, wherein said heating an ion source material comprises heating said indium iodide (InI) at a temperature of not lower than 275 °C and not higher than 380°C to generate said vapor of said indium iodide (InI).

Claim 29. The method according to claim 1, wherein said heating an ion source material includes supplying said indium iodide into an oven which has an outlet nozzle for said vapor, followed by heating said indium iodide whose particle size is larger than a diameter of said outlet nozzle.

Claim 30. The method according to claim 1, wherein, in said step of generating indium (In) ions by discharging said vapor, a support gas inlet to an arc chamber and a vapor inlet to said arc chamber are provided on one face of said arc chamber, and are configured to introduce support gas and said vapor into said arc chamber.

Claim 31. A method of generating ions, comprising:

heating an ion source material composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle and whose particle size is larger than a diameter of said outlet nozzle; and

generating indium (In) ions by discharging said vapor.

Claim 32. The method according to claim 31, wherein said heating an ion source material includes heating said indium iodide at a temperature of not lower than 275°C and not higher than 380°C.

Claim 33. The method according to claim 31, wherein, in said step of generating indium (In) ions by discharging said vapor, a support gas inlet to an arc chamber and a vapor inlet to said arc chamber are provided on one face of said arc chamber, and are configured to introduce support gas and said vapor generated into said arc chamber.

Claim 34. A method of irradiating ions, comprising:

heating an ion source material to generate vapor thereof, the ion source material being composed of indium iodide (InI) which is supplied in an oven having a vapor outlet nozzle and whose particle size is larger than a diameter of said outlet nozzle;

generating indium (In) ions by discharging said vapor; and

selectively irradiating said indium (In) ions onto a substrate to be processed.

Claim 38. The method according to claim 5, wherein said heating an ion source material includes supplying said indium iodide into an oven which has an outlet nozzle for said vapor, followed by heating said indium iodide whose particle size is larger than a diameter of said outlet nozzle.

Claim 39. The method according to claim 34, wherein the ion source material composed of indium iodide has a particle size larger than 1 mm and not larger than 5 mm.

Evidence Appendix to Appeal Brief Filed October 20, 2004

None

Related Proceedings Appendix to Appeal Brief Filed October 20, 2004

None